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SIR CLAUDE D. GIBB, C.B.E.

SIR CLAUDE D. GIBB, C.B.E.

Institution Personalities — I.

SIR CLAUDE D. GIBB

Sir Claude D. Gibb, C.B.E., D.Sc., M.E., F.R.S., is Chairman and Managing Director of Messrs. C. A. Parsons & Co. Ltd., and Deputy Chairman of Messrs. A. Reyrolle & Co. Ltd., of Newcastle. He is also a Director of Parolle Electrical Plant Co. Ltd. and of the Parsons and Marine Engineering Turbine Research and Development Association, Wallsend, and is one of the outstanding personalities in the electrical industry.

His rapid rise to his present prominent position is evidence of his remarkable academic and technical qualities. Born in Adelaide, South Australia, in 1898, he studied at the School of Mines and the University, Adelaide, graduated as Master of Engineering, and was awarded the Angus Engineering Research Scholarship.

In 1923, he came to this country and started work in the turbo-alternator erecting bays of C. A. Parsons & Co. Ltd., as a fitter. Later he was transferred to the Drawing Office, and then to the outside staff, London District, where his outstanding qualities attracted the notice of Sir Charles Parsons. He was recalled to Heaton Works as Manager of the Test House, and in 1929 Sir Charles appointed him to the Board of Directors. In 1937 he became General Manager of the Company; in 1944, Joint Managing Director with Mr. F. G. H. Bedford, and in 1945, on the retirement of the latter, Chairman and Managing Director.

During World War I he served as a pilot in the Australian Flying Corps and in World War II held the position of Director-General of Weapons and Instrument Production in the Ministry of Supply. In 1942 he was awarded the C.B.E. and subsequently became Director-General of Armoured Fighting Vehicles and Chairman of the Tank Board.

His knighthood was conferred upon him in the 1945 King's Birthday Honours List, and in the following year he was elected a Fellow of the Royal Society. In 1947 he received the Honorary Degree of Doctor of Science of Durham University, and was elected a Fellow of the Royal Society of Arts.

Sir Claude is deeply interested in educational matters, and is Chairman of the University of Durham Appointments Board, and a member of King's College Council, Newcastle-upon-Tyne. The apprentices' training school at Heaton Works is one of the most advanced in the country, and Sir Claude is also a strong believer in the beneficial effect on production of bright colours and congenial working conditions in the factory.

Among his many other activities, he is a member of the Advisory Council on Scientific Policy to advise the Lord President of the Council on Government Scientific Policy, and a member of the new Committee on Industrial Productivity. He is Vice-President of the Institution of Mechanical Engineers, President of the North-East Section of the Institution of Production Engineers, Member of Council of the British Welding Research Association, the General Board of the National Physical Laboratory, and the North-East Coast Institution of Engineers and Shipbuilders and a member of the Standing Committee of the North-East Coast Engineering Employers' Association.

INSTITUTION NOTES

March, 1948

COUNCIL MEETING The next Meeting of Council will be held on April 22nd, 1948, at the British Standards Institution, 28, Victoria Street, London, S.W.1., at 11-00 a.m.

TIME STUDY AND METHODS CONFERENCE The American Society for the Advancement of Management is holding a Time Study and Methods Conference at the Pennsylvania Hotel, New York, on April 8th/9th, 1948, and would be pleased to welcome any members of the Institution who find it possible to attend.

If any of our members are likely to be in the United States at this time, and would like to attend the Conference, particulars may be obtained from Head Office.

"SOME NOTES ON TOLERANCES AND ALLOWANCES" A comprehensive paper entitled "Some Notes on Tolerances and Allowances," delivered to the Sydney Section of the Institution by Mr. J. Piggott, A.M.I.P.E., has been forwarded to Head Office.

This paper, which covers many points and provides a great deal of specialised information, is unfortunately too lengthy for publication in the Journal during the prevailing paper shortage. It is, however, available for reference at Head Office should any members be interested in this subject.

ATTENDANCE AT COUNCIL The keen interest taken by members in Institution affairs was evidenced by the large attendance at the Council Meeting held in Manchester on January 22nd, 1948. Out of 24 Sections in the United Kingdom, only six were not represented on this occasion.

PROGRESS IN LIVERPOOL The Institution is pleased to announce that full Section status was granted to Liverpool Sub-Section at the recent Meeting of Council.

In view of the fact that this Sub-Section was inaugurated as recently as September, 1947, the members are to be congratulated on achieving Section status in so short a time.

FORMATION OF NEW SUB-SECTION The formation by the South Wales and Monmouthshire Section of a West Wales Sub-Section, with Swansea as its centre, was also formally approved by Council, and the first meeting will be held on March 11th, 1948. (see Section Meetings).

Mr. H. B. Sanderson, A.M.I.P.E., has kindly agreed to act as Secretary to the Sub-Section pending the formal election of Section Officers.

NEWS OF MEMBERS

Mr. John Bonas, M.I.P.E., has left England to take up an appointment as Works Manager with the National Machinery Manufacturers, Ltd., Bombay, India.

Mr. A. T. Davey, M.I.P.E., first Honorary Secretary of the Institution, after a number of years' experience as a Senior Production Executive with Rolls-Royce, Ltd., Allen's, of Bedford, the Stanton Ironworks and David Brown, Ltd., of Huddersfield, is now Managing Director of Manufacturing Services, Ltd., Cheltenham.

Mr. E. Granger, A.M.I.P.E., has joined the staff of British Nylon Spinners, Ltd., Pontypool, Monmouthshire, as Development Engineer.

Mr. K. A. Hale, Grad.I.P.E., is now Assistant Engineer at the Hilton Main and Holly Bank Coal Board Unit, Wolverhampton.

Mr. Robert Harris, M.I.P.E., has now been appointed Chief Engineer to the firm of Churchill-Redman, Ltd., Newcastle-on-Tyne.

Mr. D. H. Hetherington, A.M.I.P.E., will shortly be leaving this country for South Africa, where he will take up an appointment as Chief Engineer at Maconochie Bros., Ltd., Springs, near Johannesburg.

Mr. Walter Hird, A.M.I.P.E., has resigned his post as Lecturer on Production Engineering at Southport Technical College to take up an appointment as Lecturer, with special responsibility in Workshop Technology and Metrology, at Twickenham Technical College.

Mr. A. Houlton, A.M.I.P.E., has resigned his position as Works Manager with the Hoyt Metal Co. of Gt. Britain, Ltd., and is now Works Director of Messrs. Farrow & Jackson, Ltd., London.

Mr. Kenneth L. Jackson, B.Sc. (Eng.), A.M.I.Mech.E., A.I.I.A., Grad.I.P.E., has had conferred upon him by the University of London the degree of M.Sc. (Eng.), for research into the plastic strain distributions incurred in single stage drawing operations.

Mr. T. H. Jeens, Grad.I.P.E., has taken up a position as Time Study Engineer with Messrs. Guest, Keen & Nettlefold, Ltd., Darlaston.

Mr. W. E. Jeffries, A.M.I.P.E., formerly with the Plant and Equipment Division of Messrs. A. Reyrolle & Co., Ltd., is now

Chief Engineer of Messrs. British Paints, Ltd., Newcastle-on-Tyne, and their associates, Messrs. North British Plastics, Ltd., Blaydon-on-Tyne.

Mr. T. C. Jenkins, A.M.I.P.E., is now engaged as Engine Consultant to the Inspection Department at Lockheed Aircraft Corporation at Burbank, California.

Mr. D. M. Kott, A.M.C.T., Int.A.M.I.P.E., is now Production Engineer with Messrs. Ferguson Brothers, Ltd., Carlisle, where he is working under the direction of the Resident Consultant attached to Messrs. Urwick, Orr and Partners.

Mr. A. E. Kirton, Grad.I.P.E., is now an Industrial Engineer with the Texas Oil Co., Ltd., and will shortly be taking up an appointment as Branch Engineer.

Mr. H. Landstad, M.I.Mech.E., M.I.A.E., M.I.P.E., has resigned his position as a director of Morris Motors, Ltd., Cowley.

Mr. C. W. Love, Grad.I.P.E., has taken up an appointment as Works Engineer with Alexander Fergusson & Co., Ltd., Glasgow.

Mr. S. L. Moon, A.M.I.P.E., has been promoted from Deputy Works Manager to Works Manager of Messrs. Wilson & Mathieson, Ltd., Armley, Leeds.

Mr. R. W. Ransome, A.M.I.P.E., is now the Technical and Production Manager of Messrs. J. Lyons & Co., Ltd. (Cadby Hall) Factory, Engineering Section, Abbey Road, Park Royal, London, N.W.10.

Mr. Raymond N. Rough, Grad.I.P.E., has taken up a position with the Imperial Chemical Industries, Ltd., as Draughtsman in the Power and Energy Section of their Wilton Works, Redcar.

Mr. A. S. Sault, Grad.I.P.E., has now taken up an appointment as Planning Engineer with Messrs. Integral, Ltd., Wolverhampton.

Mr. G. Schreiber, Grad.I.P.E., is now Plant and Production Engineer with Vitak Timber Imports, Ltd., of Cocking, Midhurst, Sussex.

Mr. E. Scott, A.M.I.P.E., formerly Chief Planning Engineer with Singer Motors, Ltd., is now Chief Planning Engineer and Assistant Works Controller with the same Company.

Mr. J. S. Smith, Int.A.M.I.P.E., has taken up the position of Senior Mechanical Engineer at the Aimec Laboratories, Ltd., Electronic Research Engineers, High Wycombe, Bucks.

Mr. G. C. Twine, Grad.I.P.E., is now engaged as Assistant Production Research Engineer with Messrs. S. Smith & Sons, Ltd., Cricklewood, N.W.2.

Mr. W. Udall, A.M.I.Mech.E., A.M.I.P.E., has been appointed Chief Engineer of the Brightside Foundry & Engineering Co., Ltd., Sheffield.

Mr. F. V. Walker, A.M.I.P.E., was recently appointed Works Manager of Miles Aircraft, Ltd., Reading.

Mr. Norman Ward, B.Sc. (Eng.), A.M.I.Mech.E., A.M.I.P.E., has now taken up his duties as Senior Assistant in the Mechanical Engineering Department of Aston Technical College, Birmingham.

OBITUARY The Institution deeply regrets to announce the deaths of Mr. Vincent Gartside, M.B.E., M.I.M.E., M.I.P.E., of London Section, a Founder-Member of the Institution; Mr. J. Rankin, M.I.P.E., of Manchester Section; and Mr. Donald S. Loudon, M.I.P.E., of Leicester Section.

BOOKS RECEIVED "The Welding of Plastics," by G. Haim and H. P. Zade. Crosby Lockwood & Son, London. Price 21/-.

This book is probably the first to deal exclusively with the welding of plastics, which is a process of such recent practice that the authors have been able to follow its development from the beginning.

The main purpose of welding is of course to fabricate from standard sheets and sections, thus eliminating expensive moulding processes where the quantities do not warrant it.

The book contains a foreword by J. H. Paterson, and the first two chapters deal at some length with the chemistry and technology of weldable plastics, giving graphs, tables, trade names and references. Descriptions are then given of methods of welding by hot gas, heated tools, etc., and by high frequency welders, and which particular methods should be adopted for various types of plastics.

Necessary plant and apparatus required are well described and clearly illustrated by numerous line drawings and photographs. Several lists of references are given, and the book will be of undoubted value to those interested.

H. G., A.M.I.P.E.

"Dynamic Motion and Time Study," by James J. Gillespie—Management Consultant. With an appreciation by Professor R. E. Lane, F.R.C.P. Paul Elek (Publishers), Ltd., London. Price 7/6.

"Effort," by Rudolf Laban and F. C. Lawrence, M.C. Macdonald & Evans, London. Price 10/-.

"Foundations for the Study of Engineering," by G. E. Hall, B.Sc. (Man.), A.I.Mech.E. The Technical Press, Ltd., Surrey. Price 7/6.

"Engineering Tools and Processes," by Herman C. Hesse. Macmillan & Co., Ltd., London. Price 28/-.

"Time Study and Common Sense," by Abraham Cohen. Macdonald & Evans, London. Price 10/-.

"Jigs and Fixtures for Mass Production," by Leland A. Bryant and Thomas A. Dickinson. Sir Isaac Pitman, Ltd. Price 25/-.

ISSUE OF JOURNAL TO NEW MEMBERS Owing to the fact that output has to be adjusted to meet requirements, and in order to avoid carrying heavy stocks, it has been decided that the Journal will only be issued to new Members from the date they join the Institution.

IMPORTANT In order that the Journal may be despatched on time, it is essential that copy should reach the Head Office of the Institution not later than 40 days prior to the date of issue, which is the first of each month.

SECTION MEETINGS

The following meetings have been arranged to take place in March and April, 1948. Where full details are not given, these have not been received at the time of going to press.

March

1st YORKSHIRE SECTION. The Annual General Meeting of this Section will be held at the Hotel Metropole, Leeds, at 6-30 p.m. and will be followed by a lecture on "85 Years of Precision Engineering" by Mr. T. Nurrish, M.B.E., M.I.P.E.

1st HALIFAX GRADUATE SECTION. A works visit to Messrs. Frederick Smith & Co.'s works, Halifax, has been arranged for 6-30 p.m. This visit will supplement the lecture given on 25th February.

2nd COVENTRY GRADUATE SECTION. A lecture on "Boot and Shoe Production" will be given at the Coventry Technical College at 7-15 p.m.

3rd PRESTON SECTION. A lecture on "Control of Overhead Costs" will be given by T. G. Rose, M.I.Mech.E., F.I.I.A., M.I.P.E., at the Harris Institute, Corporation Street, Preston, at 7-15 p.m.

3rd NOTTINGHAM SECTION. The Annual General Meeting will take place at Victoria Station Hotel, Milton Street, Nottingham, at 7-00 p.m.

3rd WESTERN SECTION. The Annual Section Meeting will be held at the Grand Hotel, Bristol, at 7-15 p.m.

March—*cont.*

4th GLASGOW SECTION. An informal discussion will take place at the Institution of Engineers and Shipbuilders in Scotland, 39, Elmbank Crescent, Glasgow, C.2, at 8-00 p.m.

5th EASTERN COUNTIES SECTION. A lecture on " Some Measurements of British and American Industrial Efficiency " will be given by Mr. Lewis C. Ord at the Lecture Hall, Electric House, Ipswich, at 7-45 p.m., preceded by the Annual General Meeting at 6-30 p.m.

8th DERBY SUB-SECTION. The Annual General Meeting will take place at the Art School, Green Lane, Derby, at 6-45 p.m., and will be followed by three graduate papers.

8th MANCHESTER GRADUATE SECTION. A lecture on " Heat Treatment " will be given by Mr. H. G. Baron at the College of Technology, Sackville Street, Manchester, at 7-15 p.m.

9th BIRMINGHAM GRADUATE SECTION. The Annual General Meeting will take place at the James Watt Memorial Institute, Great Charles Street, Birmingham, at 7-00 p.m., and will be followed by a lecture on " Production and Application of Plastics " by Mr. L. N. Jones.

9th LONDON GRADUATE SECTION. A lecture on " Die Castings " will be given at the Waldorf Hotel, Aldwych, London, W.C.2., at 7-00 p.m.

10th MANCHESTER SECTION. A visit to Messrs. Courtaulds, Ltd., Preston, has been arranged.

10th SOUTHERN SECTION. A lecture on " Production Problems in Manufacture of Jet Propulsion Engines " will be given by Mr. R. Miller at the University College, Southampton, at 7-30 p.m.

11th WEST WALES SUB-SECTION. The first Meeting of this Sub-Section will take the form of a visit to the works of Messrs. Imperial Chemical Industries (Metals Division), Waunarlwydd, starting at 3-00 p.m., after which a meeting will be held to discuss Section business.

11th LONDON SECTION. A lecture on " Management Problems in a Small Firm " by Mr. G. P. E. Howard will be read by Mr. E. Thompson at the Royal Empire Society, Northumberland Avenue, W.C.2, at 7-00 p.m. This will be preceded by the Annual General Meeting.

12th COVENTRY SECTION. A lecture on " Cold Deformation of Metals " will be given by Mr. R. H. Bebb in Room A5, Coventry Technical College.

March—*cont.*

13th WOLVERHAMPTON GRADUATE SECTION. A Works Visit and Lecture combined with Annual General Meeting has been arranged.

13th YORKSHIRE GRADUATE SECTION. The Annual General Meeting will be held at the Great Northern Hotel, Leeds, and will be preceded by the Annual Luncheon.

15th HALIFAX SECTION. A lecture on "Observations and Views on Heavy German Industry" will be given by Dr. H. P. Budgen, M.Sc., M.I.C.E., M.I.Mech.E., at the White Swan Hotel, Halifax, at 7-00 p.m.

15th YORKSHIRE GRADUATE SECTION. The Annual General Meeting will take place at 2-30 p.m.

17th SHEFFIELD SECTION. A lecture on "Structure of Management" will be given by Mr. G. E. Chelioti at the Royal Victoria Hotel, Sheffield, at 6-30 p.m.

17th BIRMINGHAM SECTION. The Annual General Meeting will take place at the James Watt Memorial Institute, Great Charles Street, Birmingham, at 7-00 p.m., and will be followed by a lecture on "Accurate Costing in a Medium-Sized Engineering Organisation" by J. Loxham, M.I.Mech.E., M.I.P.E., F.R.S.A., supported by Mr. G. A. H. Shutes.

17th WESTERN SECTION. A lecture on "The Cold Plastic Deformation of Metals" will be given by Mr. G. Murray at the Grand Hotel, Bristol, at 7-15 p.m.

17th LIVERPOOL SECTION. A lecture on "Engineering Development at Speke, Liverpool, from Aircraft to Rubber Production" will be given by Mr. D. J. Crabbe at the Arts Theatre, Liverpool University, at 7-15 p.m.

18th GLASGOW SECTION. The Annual General Meeting and Film Night will take place at the Institution of Engineers and Shipbuilders in Scotland, 39, Elmbank Crescent, Glasgow, C.2, at 7-30 p.m. Films to be shown: (1) "They're Everywhere"; (2) "Job 99—Pluto."

18th LIVERPOOL SECTION. A visit to Messrs. Dunlop Rubber Co., Speke, Liverpool, has been arranged for 2-00 p.m.

18th N.E. GRADUATE SECTION. A lecture on "Cold Upsetting and Thread Rolling" will be given by Mr. T. C. Parker, M.I.P.E., at the Lecture Theatre, Neville Hall, Newcastle-on-Tyne, at 6.45 p.m.

18th WESTERN SECTION. A lecture on "Cold Plastic Deformation of Metals" will be given by Mr. G. Murray at Exeter, at 7-30 p.m.

March—*cont.*

18th LEICESTER SECTION. The Annual General Meeting and Presidential Address will be given at Leicester College of Technology, The Newarke, Leicester, at 7-00 p.m.

24th MANCHESTER SECTION. A lecture on "Production of Flat Surfaces" will be given by Mr. R. Whibley, A.M.I.Mech.E., at the College of Technology, Sackville Street, Manchester, at 7-15 p.m.

31st WOLVERHAMPTON SECTION. A lecture on "A Report on Management Methods" will be given by Mr. Lewis Clayton, M.I.P.E., at the County Technical College, Wednesbury, at 7-00 p.m.

April

3rd LUTON AND DISTRICT GRADUATE SECTION. A lecture on "Research and Practice" will be given by Dr. D. F. Galloway, B.Sc.Hons., Wh.Sc., M.I.P.E., A.M.I.Mech.E., A.M.I.E.E., at the P.E.R.A. Laboratories, Melton Mowbray, Leicestershire.

5th YORKSHIRE SECTION. A lecture on "Some Notes on American Production Practice" will be given by Mr. E. W. Hancock, M.B.E., M.I.P.E., at the Hotel Metropole, Leeds, at 7-00 p.m.

5th HALIFAX GRADUATE SECTION. A lecture on "Multi-spindle Automatic Machines" will be given by Mr. W. Ogilvie, M.I.Mech.E., M.I.P.E., and Mr. S. Ackrill, M.I.P.E., at the Technical College, Huddersfield, at 7-00 p.m.

7th NOTTINGHAM SECTION. A lecture on "Inspection" will be given at the Victoria Station Hotel, Milton Street, Nottingham, at 7-00 p.m.

8th LONDON SECTION. A lecture on "Some Aspects of Design and Production of Gunnery Control Gear" will be given by Mr. S. Parker, M.I.Mech.E., at the Royal Empire Society, Northumberland Avenue, London, W.C.2, at 7-00 p.m.

12th HALIFAX SECTION. A lecture on "Various Aspects of Inspection and Production" will be given by Mr. B. McMahon at the White Swan Hotel, Halifax, at 7-00 p.m.

12th LUTON AND DISTRICT SECTION. A lecture on "Automatic Electrical Control Gear" will be given by Mr. Paice at Bedford, at 7-00 p.m.

April—*cont.*

12th DERBY SUB-SECTION. A lecture on "Practical Approach of Research to Industry" will be given by Mr. H. W. Hobbs, M.I.P.E., at the Art School, Green Lane, Derby, at 6-45 p.m.

13th BIRMINGHAM GRADUATE SECTION. Members' papers will be read at the James Watt Memorial Institute, Great Charles Street, Birmingham, at 7-15 p.m.

13th WOLVERHAMPTON GRADUATE SECTION. A lecture on "Centreless Grinding" will be given by Mr. R. J. M. Whibley, A.M.I.Mech.E., at the County Technical College, Wednesbury, at 7-15 p.m.

14th SHEFFIELD SECTION. A lecture on "Deep Drawing in Electro Plate Industry" will be given by Mr. F. Parkinson at the Royal Victoria Hotel, Sheffield, at 6-30 p.m.

14th WOLVERHAMPTON SECTION. A lecture on "Cold Upsetting and Thread Rolling" will be given by Mr. T. C. Parker, M.I.P.E., at the Wolverhampton and Staffs Technical College, Wolverhampton, at 7-00 p.m.

14th LONDON GRADUATE SECTION. The Annual General Meeting and Social will be held on this date.

15th GLASGOW SECTION. A lecture on "Machine Tool Users' Difficulties" will be given by Mr. R. Taylor at the Institution of Engineers and Shipbuilders in Scotland, 39, Elmbank Crescent, Glasgow, C.2, at 7-30 p.m.

15th LEICESTER SECTION. A lecture on "Corrosion of Metals" will be given by Mr. W. Murray, A.M.C.I., F.R.I.C., F.C.S., M.Inst.F., at the College of Technology, The Newarke, Leicester, at 7-00 p.m.

17th BIRMINGHAM GRADUATE SECTION. A visit to Highley Colliery has been arranged.

17th YORKSHIRE GRADUATE SECTION. A lecture on "Workmanship and Craft Skill" will be given by Mr. R. J. Mitchell, M.I.P.E., at the Midland Hotel, Bradford, at 2-30 p.m.

17th MANCHESTER SECTION. An all-day Conference on "National Production Needs—How They Can Be Met" will be held in Manchester.

April—*cont.*

21st BIRMINGHAM SECTION. A lecture on "Cast Iron as an Engineering Material" will be given by Dr. H. T. Angus, M.Sc. (Development Manager of British Cast Iron Research Association), at the James Watt Memorial Institute, Great Charles Street, Birmingham, at 7-00 p.m.

21st MANCHESTER SECTION. A lecture on "Some Practical Aspects of Gas Turbine Development" will be given by Mr. W. H. Darlington, M.Sc., D.I.C., A.M.I.Mech.E., A.F.R.Ae.S., at the College of Technology, Sackville Street, at 7-15 p.m.

21st LIVERPOOL SECTION. The Annual General Meeting and Chairman's Address will be given at the Exchange Hotel, Liverpool, at 7-30 p.m.

21st LUTON AND DISTRICT GRADUATE SECTION. A Graduates' evening will be held in the Upstairs Lounge of The Midland Hotel, Luton, at 7-30 p.m.

26th YORKSHIRE GRADUATE SECTION. A visit has been arranged to Messrs. Frederick Smith & Co. (Wire Mnfrs.), Ltd., Halifax, for 7-00 p.m.

28th LUTON AND DISTRICT GRADUATE SECTION. The Annual General Meeting will take place at the Luton Technical College at 7-30 p.m.

ELECTION OF MEMBERS

MEETING OF COUNCIL, 22nd January, 1948

The following were elected to membership by Council:—

As Members:

C. E. Adams, R. G. Holden, H. L. James, S. E. H. Lefever, B. G. Ross.

As Associate Members:

G. A. Aldred, F. Atkinson, A. E. Ball, J. W. Booth, R. C. Bromley, G. J C. Butcher, D. Carter, M. E. Chivers, L. E. Dagwell, C. W. J. Downs, H. Fawke, A. Fletcher, W. H. Gee, H. Gibson, A. Guinness, C. Heron, E. H. Holberry, R. Hunt, N. K. Joshi, J. B. Keeble, N. C. Keene, H. Kershaw, W. H. Kimpton, G. H. Lonsdale, J. Loudon, C. W. Mace, H. L. Madeley, E. G. H. Mathews, C. Munns, G. J. Murrell, L. D. McGeady, H. Neal, W. Nuttall, P. C. Rainey, W. Simpson, C. F. S. Stalley, O. Shafik, J. L. Taylor, F. Toozs-Hobson, I. S. Varman, A. Wainwright, R. C. Wallace, M.B.E., K. M. Ward, E. R. Yoxen.

As Intermediate Associate Members:

L. Andrew, F. R. Augier, H. W. Beckett, B. Bysakh, A. Crowther, H. J. Diment, T. Devine, I. K. Dewar, E. J. Eduljee, J. Franklin, W. F. Fisher, C. H. Glasgow, A. A. Haselum, T. Kenworthy, I. Landmann, J. Leach, H. Mills, N. K. Mukherjee, C. F. Phillips, T. Robinson, S. K. Roy, L. C. Saam, A. Tildsley, L. Townend, S. D. R. Wadhawan, H. W. Wallace R. C. Yates.

As Associates:

J. Moore, H. H. Norcross, J. H. Shelley.

As Graduates:

D. L. Acharia, R. D. Billing, R. K. Bose, T. E. Bowen, J. D. Bruce, K. H. Buckley, G. P. Butler, C. S. Chanter, G. C. Clarke, M. H. Cole, L. E. Collins, G. H. Crooks, A. S. Davies, R. F. R. Davis, C. Drew, J. W. Dunford, A. H. Evans, P. L. Felton, A. S. Griffiths, P. F. W. Guest, R. Gunnell, H. Gurvich, G. R. Harris, R. J. Harris, F. G. Haycock, C. P. Holgate, G. Howard, L. A. Husain, R. J. Jenkins, A. C. Jordan, J. G. Lynegar, K. R. Matthews, S. M. Maude, F. Mitchell, E. T. Morris, H. W. Morrisey, K. S. Ormson, D. R. Piper, R. Prescott, W. Silberbach, C. G. Simcox, J. E. Soten, E. H. Stanlake, J. L. Stephens, R. C. Studdert, C. Suggett, E. L. Talbot, G. E. B. Taylor, W. Tudor, K. Vaidyanathan, G. Wallbank, A. J. Webberley, K. Whitehead, G. B. Williams.

As Students:

R. B. Allen, W. Ambrose, F. C. Ashton, A. M. Ball, A. R. Batten, S. W. Beechey, K. C. S. Budge, C. Curtis, D. R. Cobby, E. N. Coates, R. J. Collinson, S. E. Day, J. D. Evans, R. H. Fallon, E. H. Felberg, P. R. Herrick, K. C. H. Herring, N. K. Herrmann, J. J. Horsley, M. G. Jackson, E. P. Jones, R. O. Jones, J. B. Jowett, A. J. Kent, D. J. Lavender, C. H. Luter, D. Millar, H. G. Payne, T. W. Rothwell, R. J. Seabrook, S. J. W. Sproule, K. A. Steele, H. Tooby, R. Stuart-Beck, G. C. Wadsworth, H. H. Ward, A. S. Waters, T. B. Wilcox, K. L. Williams, M. Williams, T. H. Williams, W. F. Williams, E. A. T. Woodward, G. S. Wright.

Affiliated Firm:	*Change of Affiliate Reps.*
Platt Bros. & Co., Ltd.	G. A. Phillips P. A. Rippon

COUNCIL ALSO APPROVED THE FOLLOWING TRANSFERS:

From Associate Member to Member:

R. M. Buckle, T. S. Harker, R. R. Leader, T. W. Roberts.

From Intermediate Associate Member to Associate Member:

J. H. Allen, G. V. B. Bevan, G. P. Brown, A. C. Foskew, R. A. P. Misra, R. Parish, H. Preston, A. H. L. Trapnell.

From Associate to Associate Member:

W. R. Maurer.

From Graduate to Associate Member:

E. F. Aylwin, G. L. Batty, G. S. Clapham, A. Demeny, W. F. Faulkner, T. P. Forest, K. W. Gordon, R. F. Holland, R. Jackson, A. Marks, J. W. K. Murch, F. A. Rose, J. A. Smith, F. R. F. Taylor.

From Graduate to Intermediate Associate Member:

L. A. Folkes, R. I. Golding, L. E. Good, G. G. Coppola, A. E. Hamilton, E. H. K. Jeffrey.

From Student to Graduate:

D. C. Boak, F. O. Butterfield, D. Cass, R. Clarkson, C. W. Cook, A. R. Fee, E. H. Goldsmith, K. W. Hosken, J. T. M. Hawes, I. E. Jarman, K. A. James, K. E. Limbert, C. Plews, W. A. Robertson, H. J. Simon, P. J. Smith, W. R. Walton, G. E. Wells.

RECEPTION FOR EDUCATION OFFICER

On Friday, 6th February, 1948, the Institution of Production Engineers held a reception at the Dorchester Hotel, Park Lane, London, W.1, to which prominent industrialists and others interested in technical education were invited in order to meet Mr. T. B. Worth, M.I.P.E., A.M.I.Mech.E., A.M.I.E.E., recently appointed Education Officer to the Institution.

Among the many outstanding personalities who attended the reception were the Right Hon. Herbert Morrison, M.P., Lord President of the Council; Mr. E. D. Jourdain, Secretary of the Committee on Industrial Productivity; Dr. W. Abbott, O.B.E., Mr. R. G. Bellamy, O.B.E., Mr. D. M. Nenk, and Mr. H. C. Weston, representing the Ministry of Education; Sir Anthony Bowlby, Bart.; Sir Graham Cunningham, C.B.E.; Mr. J. Holland Goddard; Mr. C. W. Griffiths; Mr. E. C. Happold, Assistant Secretary of the Engineering and Allied Employers National Federation; Mr. F. T. Jackson; Captain C. A. Kershaw, R.N. (retd.), Secretary-General of the Engineering Industries Association; Sir Charles Tennyson, C.M.G., Chairman of the Education Committee, Federation of British Industries; and Dr. E. J. B. Willey, Consulting Scientist.

The Institution was represented by Dr. H. Schofield, C.B.E., Chairman of the Council, the Rt. Hon. Lord Sempill, A.F.C., Major C. B. Thorne, M.C., Director and General Secretary, and a number of prominent Members of Council.

Introducing, Mr. Worth, Dr. Schofield said:

" We have asked you to come here this evening to meet our new Education Officer, Mr. T. B. Worth, who has had long experience in production engineering. He has taught this subject at the Leicester Technical College, afterwards becoming Head of the Department of Production Engineering at the Birmingham Central Technical College. He is thoroughly well versed in the schemes of National Certificates and all that is required to organise and run these Certificates in our Technical Colleges, and it is intended that he shall visit the Colleges and give advice to the Principals in the organisation and equipment for the successful running of courses, and also make the necessary contacts with the Ministry of Education.

" In addition to these duties, it will be of great advantage to the Institution to have someone who can act as a liaison officer between the Ministry and ourselves, to co-ordinate our efforts and help to build up new production engineering courses in different parts of the country.

CO-OPERATIVE METHODS "I think you will agree that at the present time the production engineer holds a unique place in the history of our country. He is the man directly responsible for increasing our productive output, both by the use of better educated and knowledgeable personnel and by the employment of more efficient methods of actual production. We are confronted with a real national emergency and we have to tackle the problem of greater output per man-hour. That is a crucial point at present, and it can only be accomplished by co-operative methods between the workers and the management. We have to take the workers into our confidence, explain the seriousness of the situation and convince them that it is only by raising their productivity that we shall pull ourselves out of the crisis which at presents confronts us.

"We must not forget that we are relatively an old manufacturing country. Many of our factories are old-fashioned and much of our equipment is, by modern standards, obsolete. It will take time to re-plan and re-equip, and meanwhile we have to do the best we can with the works that we have. Even in some of our most modern factories, equipped with the latest and most efficient type of plant, it is clear that the average workman is not, as yet, doing all that he can. There may be reasons for this, and a solution must be found. As I have already said, it will only be found by friendly co-operative action on the part of both management and labour. In many districts we cannot look back on the past with any degree of satisfaction or complacency, but let us forget the past and look to the future.

THE INSTITUTION'S PART "It is in matters such as this that our Institution is called upon to play, in my opinion, a critical part, and it is quite different from that of the other major engineering Institutions of the country. We have in our midst the mechanical engineer, the electrical engineer and the structural engineer, and our Institution is concerned not so much with their specific knowledge, as such, as with their capacity to turn that knowledge into productive channels. We are concerned with production of all kinds, not merely engineering, and certainly not merely with machine tool making. Any form of production calls for a careful study and an attitude of mind quite dissimilar from that which is on the designing board or in abstruse mathematical calculations.

"Our members must know the quality of the materials with which they have to work and they must know the characteristics and personal qualities of the men they have to lead. I should say that the production engineer needs all the skill and ability of the mechanical or electrical engineer, together with a real understanding of humanity—that understanding which enables him to get men to work enthusiastically and willingly because they realise that

their work is being appreciated and valued. This is not easy in an age when mass production methods are becoming more and more evident, but that the two things can be made to coincide I am sure, and that outstandingly is the job of the production engineer.

"We shall be represented throughout the country by our Education Officer; he has a great task and I am confident that he has the capacity to undertake it.

"I will now ask the Lord President of the Council, the Right Hon. Herbert Morrison, to address us."

THE RIGHT HON. HERBERT MORRISON

Mr. Morrison, in his opening remarks, said: "I am very pleased to be present at this gathering which has been called for the purpose of meeting your new Education Officer, whose functions Dr. Schofield has explained so clearly and briefly. We all join with Dr. Schofield in wishing Mr. Worth the best of good luck and success in his important duties. I think if he carries out those duties he will be discharging a very useful function not only to the Institution of Production Engineers, but to the great educational institutions throughout the country, and also to industry itself.

"I have been told that very nearly all the members of your Institution are men who have risen from the ranks of ordinary labour into industrial executives. I am very glad to meet such a body of men, who have moved onwards and upwards in life as the result of their merits and their energies."

PIONEERS OF INDUSTRY

Mr. Morrison then paid tribute to the pioneers of industry—the men who during the last 100 years or so had created their own businesses and in some cases were still individually responsible for their management.

"Our country owes a great deal to these men," he continued, "for the determination, skill, knowledge and energy with which they built up industrial undertakings of one sort or another. They were certainly models of hard work—first in the factory in the morning and last to leave at night. If the people in the middle and lower reaches of industry are not always working as hard as they might, it is a good thing if the boss can say: 'None of you is working as hard as I am, and indeed, I am doing a bit more than you'. I think the men at the top should always run themselves a bit harder than the men below, although this must not be carried too far because those at the top must have time to reflect and see how things are progressing."

Mr. Morrison went on to say that there were still many firms which were run on an individual basis, but with the expansion of the large organisations had come the need to employ specialists

in many fields. In this respect production engineers had become vitally essential and an important element in industrial management, and he therefore attached the greatest importance to the existence of the Institution and the work it was doing.

Mr. Morrison hoped that the Institution would spread its knowledge through industry and encourage the vital and healthy spirit of individualism and "go-getting." Co-operation, too, was vital in order that the dissemination of information could be carried on, so that the standard of achievement might be lifted up without prejudice to the outstanding man who was able to forge ahead on his own account and with his own brains.

Closer co-operation with public authorities in business and industrial matters was also essential, and such co-operation could best be secured through organisations such as the Institution of Production Engineers, as well as through the trade associations and the trade unions.

INDUSTRIAL MANAGEMENT

"Although our capacity for production has considerably developed over the last hundred years," Mr. Morrison went on, "I do not personally believe that British industry even now is as productive as it could be. There have been revolutionary changes in industrial processes, and in the handling and productivity of labour, but they have not been applied as extensively as they could be. This business of industrial management and administration is one of the newer sciences and it is intimately related to the work which you production engineers are doing. But we have to extend it and multiply the number of really competent consultants and advisers in this field and so help industry along. I am perfectly certain there is room for advance and also room for science to play an increasingly large part in industry.

"Through the Department of Scientific and Industrial Research the Government is making grants to scientific associations for research, and this work should be of great advantage. But there seems to be a danger at the moment of accumulating scientific data without applying it rapidly enough to practical every-day work."

Referring to Dr. Schofield's remarks on the relationship between management and labour, Mr. Morrison expressed the opinion that this was one of the most important and most difficult problems to be faced. Due to widespread mechanisation, many workpeople were forced to carry out routine jobs, and it was essential that such people should know the relationship of their job to the whole industrial process. It frequently happened that managements and production engineers did not appreciate the importance of this, and such an attitude was wrong; the more the ordinary

worker understood the business on which he was engaged, and the more he felt the importance of the part he was playing, the more efficient he would be.

Labour was rightly becoming conscious of its dignity, and no longer regarded itself as something which is employed and paid a certain wage to do a certain job. Consultation was one of the most significant terms in modern industry. Labour wanted to be taken into the confidence of management and there should be evolved in industry a spirit of co-operation between management and labour. Certainly there must be discipline and willingness to obey orders, but there must be a friendly relationship and good feeling on the part of men and management. Management must always be willing to listen to ideas and suggestions, and to explain why changes are necessary. " Even if you rule against them (your workpeople) in the end," Mr. Morrison contended, " they are happier for having been consulted."

Concluding his address, the Lord President said: " I am very pleased to have been able to come here and I earnestly hope that your new Education Officer will be successful. I also wish the members of the Institution all success in their work, which is not only vital to them, but of such significance to the nation in these times of economic difficulty."

Following Mr. Morrison, Major C. B. Thorne (Director and General Secretary of the Institution) said:

" The Lord President has referred to the importance of management taking their workers into their confidence and letting them know what is happening. I think everybody will agree with that point of view. A good leader will always take those he is leading into his confidence.

PRODUCTIVITY ACHIEVEMENTS " Mr. Morrison also said that what can be done in one industry can be done in many others. It is in this respect that the Institution does help its members. The Institution of Production Engineers, to which thousands of British production executives belong, is a live and progressive organisation. Membership is restricted to those possessing high academic attainments and technical skill. Through interchange of knowledge and ideas at its many branches, and through the medium of its monthly Journal, its members have been able to improve their professional efficiency and thereby render a great service to the nation during the present crisis. I should like to mention one or two instances of recent achievements which illustrate this service.

LONDON " An increase in exports to 650 per cent. on best pre-war figures—an annual saving in material valued in excess of £35,000 per annum—a production effort which made good in six weeks more than the leeway due to the severe

fuel shortage last winter, is the amazing performance of a company manufacturing electric cleaners, fractional horsepower motors, washing machines and electric switches.

" This is the outstanding record of a firm which is affiliated to the Institution of Production Engineers, and whose Director and General Works Manager is Mr. W. C. Puckey, M.I.P.E., a Member of the Council of the Institution. Mr. B. H. Dyson, another member of the Institution, is Manager of the main factory within the group.

" Another London firm manufacturing bearing alloys, plain bearings and bushes, has achieved an increase in production of 50 per cent. between the difficult years of 1944 and 1947—a 12 per cent. reduction in the direct labour force required—and a reduction from two days to two hours in the time required for fitting Diesel engine bearings.

" The managerial efficiency of this firm, one of whose Directors is Mr. F. E. Maer, M.I.P.E., Honorary Secretary of the London Section of the Institution, is evidenced by an increase in exports of 300 per cent. on their 1938 figures.

LINCOLN

" A 43 per cent. increase in horse-power output as compared with 1938 has been achieved by a concern manufacturing engines, marine gear boxes and equipment, power units and locomotives.

" This firm has carried out intensive reorganisation of production control and planning methods, together with large scale re-equipment and a carefully planned production line, with the result that the time taken to produce certain components has in some instances been reduced by 50 per cent. The Production Manager of one of the Company's Lincoln factories is Mr. E. E. Ingleton, A.M.I.P.E.

COVENTRY

" A Coventry firm manufacturing tractors took thirteen months to produce the first 10,000, but only thirteen weeks to produce the next 10,000. This amazing performance was carried into effect by the application of advanced production technique. The Institution has several members serving with this firm.

SOUTH WALES

" A large scale development scheme is being put into operation by a company in South Wales, whose Managing Director is Mr. Julian Pode, former President of the South Wales and Monmouthshire Section of the Institution. When this scheme has been completed, it is estimated that the plant, consisting of mills, coke ovens, blast furnaces and slabbing mills, together with their ancillaries, will be capable of a weekly

production, among other items, of 16,200 tons of pig iron, 29,000 tons of steel ingots, 3,200 tons of rails and sections, and 20,000 tons of hot strip and plates. A first-class contribution to productivity.

LETCHWORTH

"A 28 per cent. higher output of steel castings compared with a year ago, with only an 8 per cent. increase in labour force, and a 30 per cent. reduction in man-hours per ton of finished steel castings is the record of a Letchworth firm of steelfounders. They have, moreover, doubled their output of general engineering products with a decrease in direct labour costs of nearly 5 per cent., which reflects admirably on their production executives."

In conclusion, Major Thorne said that these few examples taken at random were typical of production engineering achievements throughout the country—naturally many others could be quoted.

Replying to Mr. Morrison, Mr. T. B. Worth said:

"I am deeply conscious, my Lord President, of the honour of your presence here to-day. A great responsibility has been placed upon me, as Education Officer of such a virile Institution, consisting as it does on the one hand of eminent engineers who have years of experience of productive organisations, and on the other hand, of younger engineers who are enthusiastic in their application of the science of engineering to production.

"My duties must inevitably cause me to spend a large amount of time with the younger men, and I should like education and industry to feel that my services are equally available, so that we can produce a flow of young engineers whose contribution to the country's economic position will make for continued strength in that respect. It is to be hoped that their services to production will ensure that our efforts have not been in vain.

"I should like to express a special word of thanks to the Lord President for his very kind words, and also to Dr. Schofield for his remarks. With such encouragement, if I do not make a real success of the job, it will not be because I have not had real support."

EXPERIMENTAL WORK IN TECHNICAL COLLEGES

by T. B. WORTH, M.I.P.E., A.M.I.Mech.E., A.M.I.E.E.
(Education Officer of the Institution)

With increased application of science to Production, it is of the utmost importance that students in Production Engineering Courses in Technical Colleges should be encouraged to approach the problems of the Workshop analytically. This is particularly true of such subjects as Machine Tools, Metrology, and Jigs and Tools, but the analytical approach is desirable for all those subjects which may be conveniently grouped under the title of Workshop Technology. With such approach, the workshops become centres of investigation or true laboratories.

Although this point of view has been recognised, it is not always easy to carry it out as it involves the separate consideration of every possible factor, and means, ideally, the separate control of each independent variable.

(As an instance of the problem, in his articles on The Determination of Machinability, Dr. Schlesinger quotes 19 variables, which must be reduced to one before reliable results may be obtained.)

The difficulty of obtaining such an ideal becomes apparent when equipment such as a machine tool is considered, which, unlike a specialised piece of laboratory equipment, is often a nest of variables some of which are difficult to control, and unless they are controlled the results of any experimental work are neither reliable nor conclusive.

Moreover, such experimental work often has to be carried out in workshops which are used both as centres of investigation and as centres where skill in craftsmanship may be acquired and studied.

This renders the control of variables an extremely difficult matter, and when conditions as to accommodation and equipment are favourable, every effort should be made to reserve a nucleus of basic equipment for investigatory work only.

With this in mind a number of experiments have been carried out at the Birmingham Central Technical College, with two objects in view.

Primarily, the experiments were devised to provide material for the desired analytical approach, and secondly, to find out how far control should be and could be established in a dual purpose workshop, in order to give reliable results. It should be recognised that complete control implies research conditions and these are neither desirable nor attainable in such work.

As in all experimental work, success is closely allied to fore-

thought, and unless each problem and piece of apparatus is carefully studied before the investigation, the results are often inconclusive due to some obscure variable not having been taken into account.

For instance, the experiment described later involves the Cutting Action, and it was found that both bearing temperature and quantity of coolant tended to be critical. In another experiment, results were very inconclusive, and not a little time was spent in attempts to analyse them before it was realised that the characteristics of the driving medium did not conform to the expected laws.

The practice of using Laboratory Sheets which lay down the " terms of reference " for the student, is well established in Science, Materials and other Engineering Laboratories, and there is every reason for its adoption in Machine Tools and Processes Laboratories, since it encourages a systematic approach and gives practice in the all-important subject of Technical Report Writing. In this connection, the following scheme has proved extremely effective.

Typical Laboratory Sheet.

Subject. { Machine Tools or / Heat Treatment or / Cutting Tools, etc. } Experiment No.:—

Date:—

Report on.....

Object:—Concise statement to be given. 1.
Apparatus and Equipment. 2.
(Serial Nos. of all apparatus and machines to be given.) 3.
4.
5.

Sketches. For each experiment, specific sketches or diagrams should be asked for, otherwise students are liable to spend time in sketching some elaborate mechanism which is subordinate to the main idea.

Analysis of Apparatus and Theory.
Wherever possible, an outline of any theory required should be given on the sheet so that, after the experiment, the students may judge how far the results corroborate the theory. Reference to class notes is also useful.

Procedure. Under this heading, instructions are given, setting out clearly how the experiments should be carried out. Only the minimum directions should be given and the students should write up the " Procedure " as a full report.

Results. Wherever possible a tabular form should be used, even if the results are descriptive rather than mathematical.

Graphs. Directions should be given as to the best way of showing the results by means of graphs.

Conclusions and Criticisms.
Often, a series of questions can be framed so as to involve analysis of the results. Too much guidance, however, may detract from the usefulness of the method. Should serious discrepancies between theory and practice occur, the student will be obliged to use his critical and reasoning faculties in his attempt at an explanation, so that although reasonable agreement between theory and the experimental results is desirable, the experimental work is not entirely negative when results are not as good as they might be.

The following description of a typical experiment shows how an original investigation may be simplified and repeated as an experiment in the College workshops, on a standard machine tool. The experiment is described in fair detail so that a correct assessment of its value may be made. Moreover, it is also shown how, by careful analysis of the results, much more than the immediate object of the experiment was attained.

An Experiment in the Machine Shop.

Subject. Machine Tools (Cutting Tools) Experiment No. 6.
Report on the Cutting Action in Rough Turning.

Object. To investigate the variation of cutting forces in Rough Turning with respect to cutting speed.

Apparatus and Equipment.
(1) Machine Tool=Lang 17″ SS & SC centre lathe No.:—33162.
(2) Cutting Tool=H.S.S. 18% Tungsten
$67\frac{1}{2}°$ plan angle. 10° clearance
12° top rake. $\frac{3}{4}″ \times \frac{3}{4}″$ section.
(3) Dynamometer SCHIESS-DEFRIES. No.:—159314.
(4) Ammeter showing line current to 3-phase driving motor.

Sketches. (1) Cutting tool in correct projection. Fig. 1.
(2) Isometric sketch of tool and workpiece, showing total cutting force and three components (B, F & T) in planes at right angles. Fig. 2.

Procedure. The following instructions were issued to the workshop.

Note:—Throughout the test, only one direct variable is allowed—*i.e.*, Cutting speed.

(1) Allow machine to "warm up" and take no-load current input ("No load" implies head gears and feed gears in, but no cutting).
(2) Choose a billet of such a diameter that the cutting speed at lowest spindle revolutions is not less than 25 f.p.m.
(3) At lowest spindle speed choose a depth of cut and feed which will give reasonable readings at the bottom of the force scale on the dynamometer, and at the same time give a long tool life. Allow a short cutting time and take 3 readings each of F, T & B. Take the average of the ammeter readings.
(4) Repeat at next higher cutting speed and so on for at least 5 values.

Note:—The cutting edge must be preserved at all costs. Use a constant flow of coolant, and if it is thought that the cutting forces are increasing due to tool wear, recondition the tool. (See page 131 for table).

From the graphs shown on page 134, students can readily deduce that:—

(1) The Tangential component is constant and independent of cutting speed.
(2) The Back pressure rises uniformly.
(3) The Feed pressure rises but with no apparent regularity and is somewhat indeterminate in this test.

Although this satisfies the primary object of this experiment, and in particular establishes the fact that the Tangential Component is independent of cutting speed (a fact used by Dr. Schlesinger in his method of determining machinability) it is apparent that the additional readings taken on the ammeter are a source of further graphs and deductions. These are illustrated and prove interesting since they enable an estimate of the efficiency of the lathe as a cutting agent to be made. (In order to enable a true assessment of the work to be made, in accordance with the object of the experiment, further analysis is not made but there is no reason why the results should not be used to show the change in inclination of the resultant cutting force with cutting speed.)

Thus the following graphs were drawn:—

(2) No load input H.P. to the machine against spindle speed.
(3) Load " " " " " " " " "
(4) A derived curve of H.P. for cutting.

(4)

RESULTS

WORKPIECE MATERIAL	Good Quality B.D.M.S.	DEPTH OF CUT = $\frac{1}{4}$"
TOOL MATERIAL	H.S.S.	FEED = .014/REV.
DIA. OF WORKPIECE	$2\frac{1}{2}$"	COOLANT = SOLUBLE OIL

Spindle Speed R.P.M.	Cutting Speed F.P.M.	Details of Cut			CUTTING FORCES lb.			POWER				
		Depth ins.	Feed	Cu. ins./ min.	F †	B †	T †	No Load		Load		HP/CU.INS./ MIN.
								I	HP.	I	HP.	
43	28	0.25	72 CPI = .014/ REV.	0.15	220	198	396	2.5	.9	2.9	1.4	3.3
81	52			0.28	220	198	390	2.7	1.2	3.8	2.4	4.6
151	98			0.53	242	210	396	3.1	1.6	5.0	3.4	4.7
256	170			0.90	308	220	396	3.4	2.0	7.2	5.1	3.6
486	317			1.70	352	242	400	3.8	2.4	—	—	—

Averages of three readings †

Graphs drawn from the above results. See Graph Sheet No. 1.

See Graph Sheet No. 2.

The regularity of these graphs suggested that an efficiency of the machine tool might be found, based on

H.P. to overcome chip resistance $= \dfrac{T \times v}{33{,}000}$ $\quad T$ = tangential pressure lb., v = cutting speed F.P.M.

H.P. input to machine with all gears in but no cut $= P_{NL}$

H.P. input to machine when cutting $= P_L$

Nett H.P. for cutting Pc $= P_L - P_{NL}$

$$\text{Efficiency } \% = \frac{T \times v}{33{,}000\ (Pc)} \times 100$$

Results.

CUTTING SPEED F.P.M. =	28	52	98	170	317
EFFICIENCY %	67·2	51·2	65·3	65·8	*

Average Cutting Efficiency (excluding efficiency of motor) = 62·3% which compares with the figure of 60–70% usually accepted.

*At 317 F.P.M. the input power to the machine could not be measured as the current reading was off the instrument scale, but this can be estimated using the efficiency figure of 62·3%.

Thus

$$\text{Input power at 317 F.P.M.} = 2{\cdot}4 + \frac{400 \times 317}{33{,}000 \times {\cdot}62} = 8{\cdot}6 \text{ H.P.}$$

showing that the 5 h.p. motor was overloaded at this cutting speed.

It may be fairly claimed that graph No. 1 is the true criterion—there is no doubt that the Tangential Component is shown to be independent of cutting speed, and that the other components show a tendency to rise in value with increased cutting speed.

From the foregoing, it can be seen that the analytical approach is possible and there is every reason to believe that students engaged in the study of workshop processes and production technique derive great benefit from carrying out such tests and analysing the results and assessing the capacity, efficiency and accuracy of equipment.

In conclusion, the writer would emphasise that it is realised that this experiment involves equipment, such as a tool dynamometer, which may be beyond the reach of some establishments, but simple and less elaborate experiments can be devised in the workshop—this experiment being described to illustrate method and to show the type of experiment which is possible and desirable in the Work-

shops of Technical Colleges in which students are studying for Diplomas and National Certificates in Production Engineering, and it is hoped from time to time to publish details of experiments in other spheres of Production Engineering.

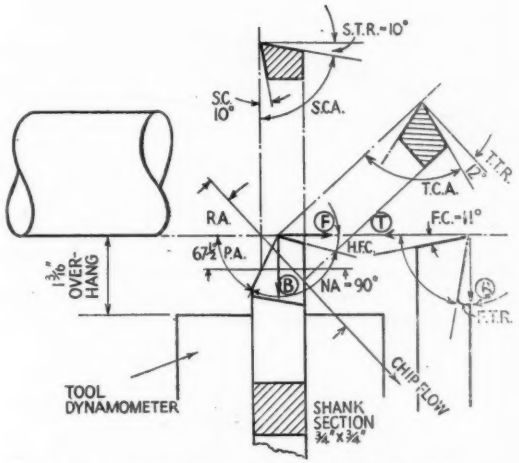


Fig. 1. Cutting Tool — Nomenclature and Values.

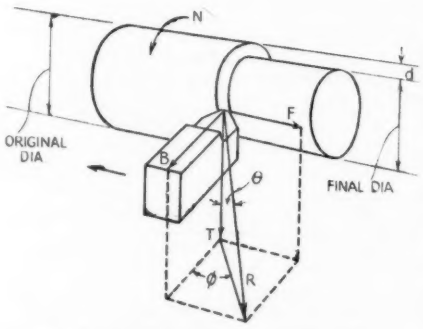
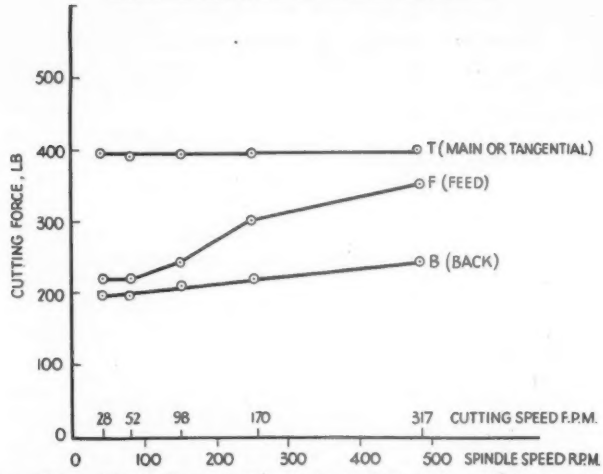
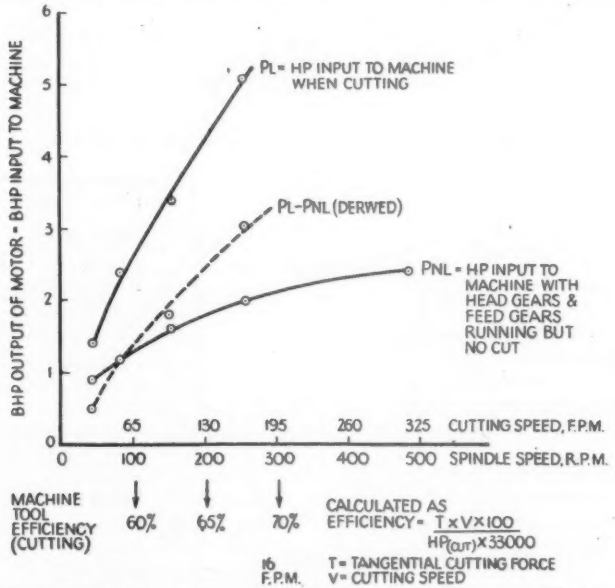


Fig. 2. Components of Cutting Force.

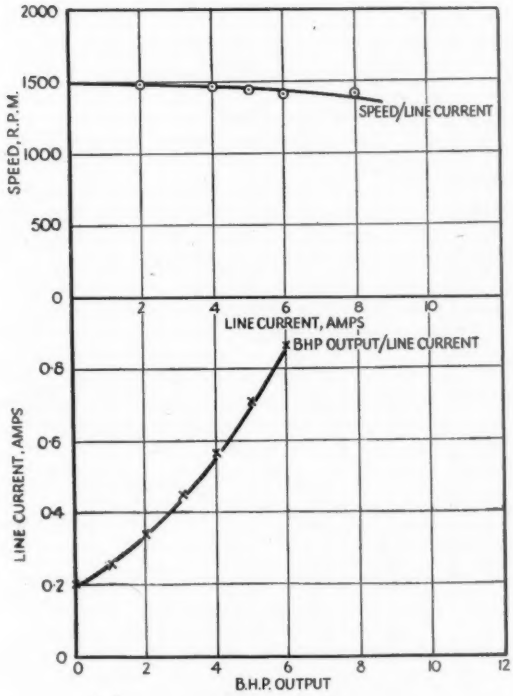
F	Feed Pressure
B	Back Pressure
T	Tangential Pressure or Main Cutting Force
R	Resultant Force
Θ	Inclination of R to T
ϕ	Inclination of plane containing R to plane containing B
d	Depth of Cut
N	R.P.M.
F.P.M	Calculated on Original Diam.



GRAPH No. 1. Cutting Forces in Rough Turning - Variation with Cutting Speed.



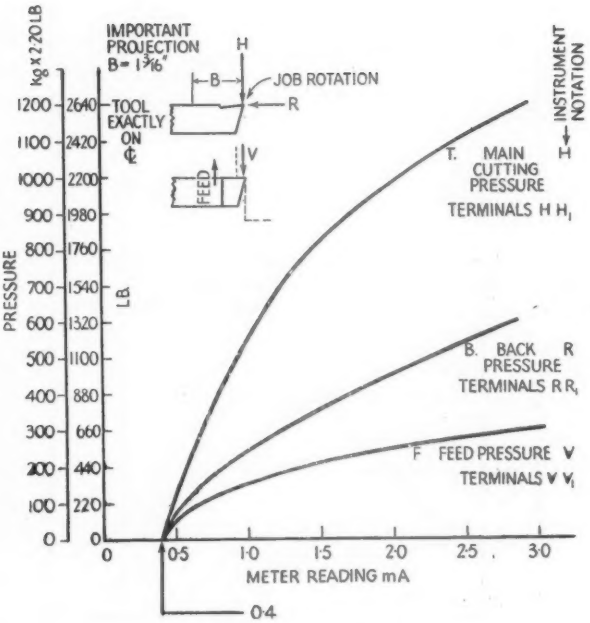
GRAPH No. 2. Cutting Forces in Rough Turning - HP Input to Machine.



GRAPH No. 3. Calibration of Motor used in Cutting Tests—Performance Curves.

Motor : English Electric Company ALK 3 — 5 H.P. 1415 r.p.m. 7.4 amps. No. 5 R 2628/1 — 3 phase — 50 cycles.

Machine : Lang 17". Centre Lathe No. 33162.



GRAPH No. 4. Calibration Curve.

Schiess-Defries Pressure Measuring Instrument No. 159314.

***Important*:** All three instruments must be adjusted to this value for zero pressure. When loaded, pointer must not pass through zero point.

FOREMEN AND THEIR DUTIES

by ERIC MENSFORTH,
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Paper presented to the Sheffield Section of the Institution of Production Engineers, November 12th, 1947.

The size of the audience here to-night only emphasises in my own mind that it was with some fear that I agreed to speak on this particular subject. It is one on which books have been increasingly written recently—whether it is one about which you can best read in books, I leave you to judge. It is certainly an enormous subject and one of great importance, and most particularly is it one (and the writing of books may be one of the things which shows the modern tendency) which is the better for discussion. It is in the expectation that we shall have a good discussion that I am speaking to-night, and the success or failure of this meeting will be judged by this.

I do not propose to try and answer all the questions, but hope that we shall be able freely to discuss the various points which must be in our minds at this time as to the difficulties of the foreman's position and the nature of the duties which he is expected to perform.

THE FOREMAN'S POSITION

It is peculiarly apt, I think, that Production Engineers should consider the foremen's position and the human channels through which they carry out their jobs. We are apt to consider machine tools and jigs, manufacturing methods and so on, and I think we can well devote some of our time to this human question.

Whenever human beings get together to undertake a project, they find it necessary to co-operate to unite particular skills or to direct a number of people and for that they initially use an organisation. An organisation is, by its name, organic; it is live, or should be, and like anything else that is live, it can die. It is the most important thing to us in industry that it should be live, but unfortunately, organisations—particularly under State control—frequently are prostituted and then they become the master, instead of the means of drawing a number of people together in a co-operative enterprise.

We shall have to go through some self-evident things, because all that we are going to talk about is generally basic. Organisations are of two types: the simplest, frequently called the military type,

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where one simply gets a chain of command, and the functional organisation, which is that common to modern industry. Insofar as we are concerned to-night, the aspect of organisation which we want is that channel through which the intentions of all concerned in the organisation are finally transmitted to the job; the human element for this is the foreman.

FUNCTIONAL ORGANISATIONS

Here I would say right away that the foreman is essentially an integral part of the management of any undertaking and he is that part of the management which the majority of people in industry see. Through him they obtain their portrayal of their higher management, technicians and so on, and vice versa. When we come to consider a functional organisation we all recognise that, from the earliest days of making things, people have tended towards specialised skills and no man has found it possible to become effectively a master of all trades.

A functional organisation exists to bring together specialists so that one may have such experts available, each to bring his particular skill to bear on the undertaking of a project. There are many misunderstandings which arise in any functional organisation because, of necessity, it does mean that from time to time people are told that someone else is going to carry out a job which they have been accustomed to doing.

As an example, a particular manager or superintendent may have exercised much of the buying function, perhaps only supervised by a Director as to the placing of contracts, and dislikes some centralised buying control. I mention that fact because it may particularly obtain at the foreman's level; there are many jobs performed by others which at one time he would have done directly himself.

A typical functional organisation will be headed by a Board of Directors which ideally, as frequently obtains to-day in this country, will be largely working executives. You have a limited number of part-time people who by reason of experience can bring particular advice of general trends, and certain full-time executives who have been promoted from the organisation as a whole. The Executive Board might well consist of a Chief Executive, Technical Director, Sales Director, Production Director, probably a Labour Director, someone in charge of finance and the like. Their duties are fairly obvious. The Chief Executive's business is to plan ahead, to co-ordinate the efforts of his colleagues and perhaps, as specialist, throw his weight where it is needed. The Technical Director must look to research, design and specifications. The Sales Director has to handle selling and particularly contracts, which frequently is divorced from selling. The Production Director has to look to

material procurement—(in some organisations this may come under a Buying Director)—to all the means of production—machines, jigs, etc., to planning, labour control, rate-fixing, estimating, stores, internal and external transport and inspection.

That gives us some impression of the sort of organisation in which we are to consider the position of the foreman. An organisation must be live and to be effective must have a purpose. It is often said that adequate preparation must precede execution and a primary function of the organisation is to make that adequate preparation for the execution, which is ultimately wholly carried out on the shop floor by direct labour. An organisation should have a degree of permanency; people want to feel that working in it, they can look forward to promotion and to their old age. It should have some stability. It must have flexibility from new blood coming into it and a willingness to accept new methods and to look for new jobs. It must be balanced, and by that I mean in particular that the organisation must not dictate too far, owing to its structure, the whole way in which one tackles a job.

THE FOREMAN'S DUTIES

Essentially the form of organisation is servant to the performance of what we want to do. It must obviously be progressive and it should result in efficiency. These different functions come ultimately to bear on the product through the operative. The final channel through which they come is the foreman, and we have to attempt to analyse the foreman's duties and the qualities which he needs to carry out those duties.

Primarily, I think a foreman is to be distinguished from the skilled operative in his ability to direct the work of others. That is his principal function. One might briefly define his job as being the ultimate representative of management with the task of securing economical production, or execution of the particular project, in a timely fashion to a satisfactory quality, while using effectively the services by which he is surrounded which are, as we have seen, of a functional specialised character.

The first difficulty one is up against in considering the foreman's duties is the tremendous range of jobs over which he does exercise control. They can vary from a small but highly specialised section, small in numbers of employees, where the primary job of the foreman, particularly if the other employees by the nature of their skills are relatively high-class, stable men, is to control that section—he being chosen because of his experience; this is perhaps the simplest from our point of view. He has only to see that the job is effectively controlled from a skilled tradesman's or technician's viewpoint. His duties can vary from that small but highly specialised section to a very large department, probably with a great many

different types of craftsmen in it, and many different jobs being carried out; here his major job may be to see that the different human elements are reasonably harmoniously kept at work and his particular skill is of secondary importance.

That gives one a very wide range to consider, but I would say, as a personal opinion, that the first requirement of any foreman is that he should be a master of his own particular trade. Whether that trade is the only one used in his shop is immaterial—he will be a skilled tradesman in the first place. This is not in itself sufficient. He must have an aptitude and ability in handling and directing men, to get work from them. We can try to itemise the duties of foremen and then to see what those include in detail and to see how far some of the functional characteristics of a normal organisation bear on the execution of those duties and on the foreman. One might say that a foreman's job includes broadly the planning of work, including the receiving of instructions, the preparation of materials, tools and equipment, and then the initiation of work and its movement, progressing, quality control and costing.

CONTROL OF LABOUR

He then has labour control as another big group of duties. He has got to suit the right man to his job, he has got to look to working conditions and to incentive. He must exercise impartial supervision and maintain discipline and timekeeping. Finally he has to show some element of forward-thinking in his department's development.

We can then take these duties in detail and, in doing so, realise again the process of evolution which we have gone through in reaching the modern complex set-up of the average industrial undertaking and what it brings to the foreman.

Fundamentally, a foreman's duties embrace everything which a small one-man show would embrace to the owner. If an engineer has an idea, perhaps patents it, gets some money, goes into business on his own, then he has to do all those things which we have enumerated. He has got to decide to make it, see to the execution of the job in such a way that he can be satisfied with the price at which he has previously sold it, see that his quality is satisfactory so that his customer comes back again, see that it is delivered in a timely fashion and see to the continuity of the business. We will now take the foreman's duties as we might conceive them.

First of all—labour. He has got to see to the hiring and firing of his own labour. He has to see that his labour is proportionate at all times to the work which he has to carry out on his shop floor. In practice that means that a Personnel Establishment or a Labour Officer, someone in any case immediately separate from him, receives from him notice that he requires labour and of what type, goes through all the complicated motions of to-day in relation to

the various Labour Control Orders, the Labour Exchange, the avoidance of advertising and enticing other people's labour and so on, and ultimately, it is hoped, obtains for him a selection of labour.

This is one of the first things in which a foreman does find a good deal of difficulty in a large organisation. Generally speaking, he has very little choice when that labour comes to him and he has to make the best of it. He has some choice in theory and frequently in practice, but much of the earlier individual interviewing has been eliminated from his day-to-day routine. He receives the labour with its conditions of employment already laid down for him, but he must be entirely familiar with those conditions, which are very complex to-day in the British engineering industry, so that nothing is done by him which can establish difficult precedents or cause disputes.

The matter of "firing" leads to the next most important problem, which is that of maintaining discipline without anyone on the Labour Exchange and without a breadline down the street. There, I hope, we are going to hear some questions and some suggestions and answers because one of the greatest difficulties with which we are faced at the foreman's level is the effective maintenance of labour management.

MAINTENANCE OF DISCIPLINE

We are told that there are a number of easy answers—leadership, good working conditions, incentive and so on, but the plain facts are that to some degree or other there is always an element of undiscipline. Human nature being what it is, one hires people who are to a degree unsatisfactory; one has trouble with them and yet, if there is no alternative, one may desire to retain them, as 90 per cent. efficiency may be much better than nothing at all; but in retaining them the maintenance of discipline may suffer, and that is a major problem at the present time.

In connection with discipline, one has the whole of the relations with organised labour and with the Trade Unions to consider. As is well known in this country, it is not like others such as the U.S.A. and Canada, where you may make annually your own contract with your own particular Trade Union and renew it every year. In most industries in this country we bargain nationally. There are various arrangements for handling disputes or for attempting to avoid them and it is there again that a foreman must be very familiar with these arrangements and be very certain that, while maintaining his own position as manager or supervisor of his department, he does nothing that can be construed as showing that he was wrong in the first place.

The handling of shop stewards and convenors is particularly a foreman's job with many thorny problems involved, e.g., how far

they should go into other people's departments and compare the practice of one foreman with that of another. The matter is further complicated by the evolution of the Works Committee into the Joint Production Advisory and Consultative Committees. The Works Committee, which probably started about 1908, was in most establishments well understood and carried out a very useful purpose but, in my opinion, has been made more difficult by the quasi-legal backing which it has received since the war.

My own view is that these bodies are indispensable in this country. We all know that if you analyse their minutes at least 80 per cent. of the items are concerned with very minor matters of the comfort and dignity of the operators, a further 10 per cent. with procedure, another 5 per cent. with nonsense and 5 per cent. with constructive suggestions. But they are useful in that human beings want to feel that they have an outlet for grievances, that they are taking a responsibility in management, although fortunately or unfortunately the majority wish to have their affairs handled by others.

CONSIDERATION BY MANAGEMENT

The J.P.A.C.C. is very important to the foreman because his shop discipline can most easily and readily be undermined by a management above him which is, in respect of the Committee, careless of his position. It is essential, especially in large organisations, where owing to the relative smallness of the Committee an individual foreman may not be present, that his interests be fully safeguarded by seeing that he knows all about its business; also the matter should not be brought up at all until it has first been discussed with the foreman and he has agreed that it is a proper subject to take up at this Committee level. This requires a wise choice because you have to leave something on the agenda in order that the Committee may be allowed full scope.

It is the foreman's job to reprove undiscipline, bad workman ship, bad timekeeping, and the like. It is very necessary that reproof should be administered in a proper fashion, that is, not in public, and that with reproof (and I believe this is very frequently forgotten in United Kingdom concerns) it is fair to give an equal measure of praise. It is the business of the higher management to see that praise is passed on to the foreman and that the foreman passes it on to the operative, so that if a good job is done it is known that it is appreciated. If a customer mentions his satisfaction specially, it is through the foreman that the operatives should know that the Company has earned a measure of praise.

It is the foreman's business to see to training. The training of junior people is in his hands, and there he must exercise a very definite discretion in favour of the person he is training rather than

the job he is trying to get done. If he has a youngster who proves very able at his job, it is my opinion that he should be moved on to something more difficult, and that the Company should accept the fact that during training they are not going to get a maximum of output from him, The foreman may have to face the problem of training adults more regularly in this country than in the past. We have tended to stay in one particular field and if that job dies, just to regret it and hope for the best. People will have to change their trade and that will bring a new difficulty to the foreman. It is his business to watch labour turnover, to ascertain why this is high, whether working conditions are upsetting employees and so on.

MEANS OF PRODUCTION

His next duty relates to the means of production. First of all, we assume that the foreman has been provided with a portion of the factory; here I would say that those whose business it is to provide factories, if they already have an established body of foremen, should see that the layout of the shop is subject to the scrutiny of the foreman before committing themselves too far to execution. He will obviously have many points of experience which cannot be obtained in any other way.

Having got his factory, his first job—with all respect to us in Sheffield—is to keep it clean. There is no factory which is dirty which produces very good or economical work, and that is a major matter. A foreman should see that it is kept so that he can " eat his dinner anywhere off the floor," with everything with a place and in its place.

The secondary effect of that will be to encourage labour, particularly tradesmen, in some understanding of the dignity of their job. They will get more satisfaction from the work and I think you will find it easier to get a good type of man.

Cleanliness of machine tools is obvious; a great many are destroyed through dirt and nothing else. The foreman has to look to the maintenance of his equipment, probably by calling in specialists, and it is his business to know the state of his machines and to see that preventive maintenance is exercised, rather than repair. It is his business to see to safety, probably with some democratic Safety First Committee on which he will be represented. It is his business to see that the jigs and tools with which he is provided are adequate. He must, from time to time, get into the Jig and Tool Office and explain to them how theoretical they are getting and why they want to get both feet back on the ground.

PROGRESSING AND PLANNING

He has to plan his work through his shop and to get it out in a timely fashion. The degree to which he must carry out that planning depends on the functional organisation. He may be, quite frequently is, provided with process sheets, the jigs and tools he is going to use, the speeds and feeds he must employ, etc. Even then he is left with a considerable margin of discretion as to when he puts a particular job on a particular machine and his is the ultimate responsibility that the job is done at the right time to the right quality.

He has to be associated with material procurement. The buying organisation has seen to the obtaining of material and then it is put into his Stores or dealt with by a centralised Progress Office, but he must then route it to his machines and see that it is there with the drawings, the gauges, the jigs and the tools at the right time.

He has to see to the execution of the work, which means that he must have the labour there and must be satisfied with the basis on which that labour is to be employed. Assuming that it is a piece-work shop, this means that the foreman must have, as a very important duty, that of making certain that his ratefixer is fair to both sides and that is an element I would emphasise. It is the foreman's duty to see fair play and to see that his labour is given a fair price and can then work to utmost capacity and earn a good bonus in the knowledge that that price will be upheld. On the other hand, if the price is mean, he must be prepared to see that the ratefixer is reasonable about it.

He has got to adjudicate, when piece-work is not possible, on the always vexed question of paying something in lieu of day-rate, particularly where a skilled man is not prepared to go on unless his earnings are practically guaranteed, and on the conditions in which a man should be working day-work.

He should be able to adjudicate on any question of merit or ability, or responsibility money which may be paid in the shop. His must be the final decision on these matters.

DIVISION OF RESPONSIBILITY

Inspection will be the responsibility of an authority other than the foreman—probably the Works Manager, or Director of Production—but such inspection in most cases must be a guarantee that the customer's interests are being watched rather than a means of reducing the responsibility of the foreman or the operator. If there are entirely unskilled operators and the machines have been set up for them, then it is the responsibility of the inspector, particularly if it be a

regular inspection, to tell the machine-operator or the foreman when something wants doing, but the responsibility for getting the job done correctly is still that of the foreman.

Finally—cost control. The first thing to enable the foreman to exercise cost control is a knowledge of costs. This means that he must be given the fundamental facts as to the estimates and running expenses of his shop. The foreman, with his great multitude of duties, has not time to study that mass of information which the Works Manager may be expected to digest, but it is possible to put the information before him in a form that is useful. He should be able to check the finished costs of his job as against the main elements of the estimate, preferably with a standard cost if the work is of such a nature.

His first elements are direct labour. If it is piece-work, this is easy. Indirect labour is also under his own control and as important as the direct labour, but frequently forgotten in many shops. Finally, he has those items of ordinary overhead expenditure which are directly under his control—all the consumable stores, the essential supplies such as electricity, heating and so on, and these should be watched by him with a view to the exercise of every reasonable economy.

ESSENTIAL QUALITIES

We have seen the vast range of the foreman's duties. We have said that the man himself must be a skilled tradesman; he must be capable of directing labour and to do that he must be able to direct himself and have self-control; he must not be the typical music-hall foreman capable of losing his temper on the slightest provocation.

He has to be enthusiastic, otherwise he would never get through his work; cheerful, stable, and with a sense of proportion. He must be a good instructor and capable of leading by example. He should be impartial and everything that is meant by professional. He should be ambitious—it is from the ranks of foremen that those of the production hierarchy should be drawn. He should have initiative and preferably should be prepared to answer back, because it is only by answering back that his chiefs will get to know many things. The foreman must have means of educating himself. Personally, I believe one of the best arrangements is that he should have opportunities for visits elsewhere, for meetings with other foremen, superintendents, works managers, to exchange views and particularly have discussions such as this to-night.

I will conclude my remarks as I started, by asking that you will amongst you now seek to discuss some of these highly difficult and in some cases, controversial points, which I have tried briefly to summarise, and see if we can get anything from them.

DISCUSSION

Mr. WILLIAMS: Obviously, I should not make a good foreman. I do not attain those high standards set by our speaker, but I have certainly a great interest in foremen. We are not all engaged in the occupations of which Mr. Mensforth has spoken. As many of you know, we have engineering shops principally engaged on maintenance work, but have to have the principles of control that you have in the shops particularly referred to in to-night's address.

We have many other departments engaged more directly on iron and steel production, in the making or processing, where foremen again must have the qualifications and training for their respective jobs, just as much as on the more specialised processes in the more highly developed engineering shops. Here the training is different and it may be that foremen have not to be chosen from the most skilled craftsmen in their departments.

I would say that if it is possible to get from your most skilled craftsmen men who are not afraid of carrying the many responsibilities referred to, and who consider that the margin of income over that of the highly skilled workman justifies the additional worry—and this I think is the greatest deterrent to-day to a good man becoming a foreman—then naturally those are the men to choose.

In the iron and steel producing sections you have men who come into the promotion schemes arranged with the Trade Unions and also other schemes and it is rarely that a man is taken from the promotion schemes on to the staff for foreman's duties or managerial duties. In the main, men who rise to the top of the production sections have more income than has been given in the past to foremen or to some managers in these departments. For that reason, but not for that alone, it is not often that a man comes from those ranks. We have had more failures than successes in making that type of promotion. I think the reason for this is that there has been little preparation made by that man for taking over or organising other people's work. He is all right up to the stage where he has been asked to leave his ordinary duties. He has been quite satisfied to do the job that he was doing, and that immediately above it, without having any greater sense of responsibility, and, while not lacking in skill, he has eventually broken down because he could not carry responsibility. On occasion, such men have created even greater differences between their employees and themselves than existed between the employees and those who had been trained specially to be staff members in those producing departments. It is a great pity, but it is the case. These men also had to be responsible for administrative rather than technical duties, probably for 80 per cent. of their time, so that this specialised

training was not particularly required. So we sometimes nowadays train people especially to become foremen and later managers. Another feature is that in the past the man who worked " on the job " had not always had the opportunity or inclination to study the more technical aspects of the work in his departments. However, those men we selected *had* done that, to their credit, but, unfortunately, they had not all been successful on the other side. We have had the reverse examples also of men who were really successful, possessing the temperament and ability to handle their men.

In the Engineering Shops we adopt the procedure that has been referred to to-night. It was difficult at one time, even in these last ten years, to encourage good craftsmen to be foremen, not solely on account of the financial point of view, but because many men were asked to become foremen at a time in life when they did not care to make the change. Time has done something to change that, and we are finding that younger foremen coming along to their jobs in the late twenties or early thirties are having considerable success. The younger men are benefiting from the technical education which has become available. I feel that it is by adopting this procedure of " choosing them early " and, where possible, giving them permanent duties as assistants and not just filling in when someone is away that we have been more successful in our appointments.

Reference has been made to the difficulties experienced to-day with the different forms of procedure on Trade Union matters. There is a real difficulty here. There is a tendency on the part of the Trade Unions for matters to be dealt with on a rather higher level at an earlier stage than in the past. In other words, there is a tendency on the part of the Trade Unions to by-pass the foremen who have not immediately conceded the men's point of view, and to go forward to the Personnel Manager's level, taking the matter out of the hands of the foremen. That presents a difficulty which can only be met by the right understanding between the Personnel Officers, the engineers and the foremen. It is so easy to have misunderstandings arising on account of the Trade Unions, but I am quite certain that if steps are taken to keep everyone informed, as you suggest, then the difficulty can be removed.

Managements have sometimes created difficulties for the foremen. In the early days of the operation of the J.P.A.C.C. we made the mistake of allowing the very thing to happen which you have mentioned—that of representatives of departments speaking in the J.P.A.C.C. meetings on matters which had not previously been taken up with the foremen. The Chairman of our Committees,

in all innocence, allowed discussion on these points, until they acquired the right technique and eventually got the matters back on to the shop floors.

In the early days, certain of our foremen felt that shop stewards were usurping their positions and many men were only too willing to allow them to do this. Correcting this impression has just been a matter of time, and the position has been vastly improved. In questions of general discipline there was a tendency occasionally not to accept the ruling of a foreman. I do not think that our foremen made many mistakes, certainly no more than higher management makes in dealing with discipline in the departments. The foremen were, and still are, the first line of approach on all these questions, and they were naturally shy of taking the full responsibility which might lead to difficulties in other shops. Here again that improved contact between the Personnel Department and the foreman has in time strengthened the foremen's position. If the foremen make quick reference to ensure that they are on the right ground and have the backing of the Personnel Officer, then their position is considerably eased.

I have in my pocket the wage ticket of a foreman in the year 1868, and it is rather interesting to see that in those days they had their troubles, and that it was necessary for the companies to have certain rules which would assist in strengthening the foreman's position. Rule No. 9 says: "Any workman using disrespectful language to the foreman or refusing to obey his instructions will be liable to a fine not exceeding the sum of 10s. 6d. or, in the option of the Company, to such punishment as the law allows." We have come a long way since then. This man received £3 18s. 4d. for two weeks' time and he was one of the senior foremen in those days.

I am only opening the discussion, even if I seem to be adding to the address, but I was wishing to develop one or two points which would help you to offer critical comments or to raise other additional points.

Mr. S. R. Howes (Past President of Sheffield Section): I would like to congratulate Mr. Mensforth on his excellent survey of this very difficult, and at the present time, controversial subject.

He referred to all the mass of words which have been written recently on this subject, and I have noted the same thing—have read volumes and wondered—why?

With this meeting in view, and since I was asked to open the discussion with Mr. Williams, I thought I had better not rely entirely on my own narrow point of view, so that I asked others if they would submit what they thought about the foreman and his duties, and was reminded of a reply I got at one of the foremen's meetings, when this same question was under discussion; one man

said that " a foreman needs to be a genius, a lawyer and a stoic," and that is the impression I got from the various replies from the people I had asked to comment on this subject.

I can, therefore, understand any foreman feeling that if he is to attain all the qualities that are suggested by the various writers, that he has a difficult, if not impossible, task in front of him.

I have considered why this subject is so prominent at the present time, if it does not mean that there has been something wrong with foremen in the past, and this is difficult to believe since the industries of this country have a wonderful record of achievement, and it seems to follow that there cannot have been very much wrong with the foremen of those years. There must be some reason for the prominence of this subject at the present time, and it occurs to me that we are now going through what amounts almost to an industrial revolution. There is an entirely new outlook in industry, which has come about perhaps more rapidly because of the recent war. Whereas formerly foremen have adapted themselves to gradually changing conditions, we are now finding that they are not adapting themselves rapidly enough to the new conditions we find in industry.

Mr. Mensforth mentioned discipline. I do know how the foreman feels about this particular question. It has been said to me on many occasions that discipline has gone because we cannot " fire " a man, and if we do there is no one to replace him. There has certainly got to be a different approach to this subject, and I am looking forward to hearing this evening proposals as to how the problem can be handled, since discipline must be maintained.

My own view on these changing conditions and the approach that managements must make is that far greater attention must be paid to the question of training. I am not suggesting that foremen as a body are not doing their jobs excellently—I believe that generally speaking they are—but I do think that greater care is necessary in the choosing of foremen; they must, of course, have the necessary character, knowledge of the job, etc., but I feel that more attention must be given to the question of ability to instruct. They must have an understanding of how to handle men, and also a more scientific knowledge of how to analyse the work under their control. We should, therefore, provide some means for systematically training foremen in this way.

With regard to the question of a foreman knowing how to instruct, it is obvious that he needs some training in this direction, however expert his knowledge. We know that in the scholastic world there are many brilliant people who cannot impart their knowledge to others without suitable training.

Then we come to the question of discipline, which is mainly a question of human relations. Except in extreme cases, instead of

relying on the power to fire a man, the foreman has to learn how to lead him, and to deal with his men in such a way as to avoid many of the problems which normally arise in every shop.

Finally, there is the question of efficiency in carrying out the work under the foreman's control. Because a man is an expert at the job he is controlling, it does not necessarily follow that he is qualified to analyse the job and sort out the facts. I know that what I am saying is known as "Training within Industry," and whatever one may feel about the methods advocated by this system, we cannot quarrel with the principles involved.

I believe the Joint Production Advisory Committees are affecting the foreman's position to-day, and I was glad to hear Mr. Mensforth and Mr. Williams speak on behalf of them, because I wholeheartedly endorse what they have said. I am attending a lot of J.P.A.C.C.'s at the present time, and I find them most interesting and fascinating. I have listened to discussions this week which I am quite sure everyone here this evening would agree are a valuable contribution to the efficiency of the factory.

At the outset, I believe the foreman is inclined to regard the J.P.A.C.C. as the usurper of his functions to some extent, but with the proper outlook and training he can be brought to realise that the J.P.A.C.C. is a most useful tool for the improvement of the organisation of his shop.

I must tell you, however, of the first suggestion which we received at one of the earliest J.P.A.C.C. meetings, which was to "sack all foremen, and then we shall get something done." We have travelled a long way since then, and the committees have now settled down to most useful and valuable work.

Mr. WADSWORTH: I do not think that sufficient has been said about the question of the status of the foreman. It is an important point. So far as the foremen are concerned it is the main grouse to-day that they have to work in some piece-work shops, rolling mills, etc., often at salaries less than those of the people they control. Frequently they have to work longer hours, and, in the case of a good foreman, he has to plan for 24 hours a day. In other words, the basic principles of his job are worse than those of the people he has to control. They come and go at the beginning and end of their shifts but his job never stops, and I do not think that sufficient regard is paid to that fact. The question of salary is important; but equally so is the question of relief—ensuring that his weekly working times are no longer than those of the people he controls. Then there are all the other questions affecting his status—whether he has to clock on, his system of payment—whether he is to be paid monthly, weekly, or on time-rate—and so on. I think all these matters have to be seriously considered by industry and the foreman given the highest possible status.

Speaking of J.P.A.C. Committees, we usually find that at the head of the Production Committee is a set-up in which, because of the large numbers involved, it is only possible to have one or two foremen. That means you may have shop stewards, etc., who get to know more of the business of the Company than the foremen. As a rule we need only one foremen's representative on the Works Council itself, but to get over that difficulty at Park Gate we have started a Production Committee for foremen themselves, at which they can put forward and discuss their own points of view without being embarrassed by the presence of the workpeople. I think that is a link which improves the status of the foreman—he is then better informed than the workpeople. You can sometimes tell the foreman something that you cannot tell the rank and file.

Mr. BAILEY : I would like to ask Mr. Williams if he would add further to the discussion about the training of foremen. I have found that operatives are more likely to be guided by a man with a certain amount of technical experience than by a young man who has been trained as a foreman. I have found that when a young foreman, no matter what training he has had, goes through these departments, any progress he makes is due to the operatives working there. At the same time, the operatives consider that his progress is at their own expense. It is certainly not the operatives' fault when a young man, probably qualified as to education, is brought forward and the time comes when animosity arises in the shop.

I consider that a young man who has had technical experience in the works is able to lead operatives better than a young man with a University education, and they prefer to approach the man with the technical experience and to accept his decisions.

Mr. WILLIAMS : I tried to draw a distinction between craftsmen and foremen. In the case of craftsmen, the foremen are all ex-tradesmen who are brought out, given an assistant foreman's position and later a foreman's position. If we take a rolling mill team, usually before a man gets to the top of that team he is 40 or 50. He may be, undoubtedly is, the best man for looking after the rolling team, but he is not responsible for the management other than the actual rolling.

It is customary to train a boy on the staff from the age of 16 or 17, having approximately four years' training in all departments, until, towards the end of that time, there is some indication that he might be required. He takes part-time education and is then introduced to one of the staff duties and eventually becomes shift manager or, later, the steel maker. He is technically better equipped than the ordinary furnaceman, and the furnaceman appears to prefer the old system of promotion. Thus we have two systems: the technical duties on the production side, and, on the craftsman's side, more craftsmen themselves.

Mr. JACOBSON : Most of the points I wished to make were effectively demolished in the beginning, but there is one quality which I think Mr. Mensforth omitted—that of a very good sense of humour. I once heard this definition of the foreman: " He must have the wisdom of Solomon, the tears of a crocodile, the cunning of a serpent and, finally, the constitution of an ox."

I think the majority of foremen in the large organisations are very remote from the top level of the management. Workers are getting closer to the higher levels, but most foremen can only go through their superintendents when dealing with matters of technical planning and the superintendent is often a very busy man. I think the case has been very well put for the development of Foremen's Production Committees.

Mr. MAKIN: I cannot agree with Mr. Mensforth when he says the foreman is the be-all and end-all of piece-work prices. No self-respecting rate-fixer would stand for that. I would like to know if Mr. Mensforth agrees that, as the foreman has the spending of the money, he has the actual figures relative to the spending of the money for which he is responsible. The foreman is there for production, not to waste his time going through a lot of meaningless figures.

Mr. MENSFORTH : I have been misinterpreted in saying that the foreman is the be-all and end-all of rate-fixing. What I intended to convey is that the foreman must be the impartial person on matters relating to piece-work rates and must see fair play. In any matters of bargaining there must be an arbitrator, which does not mean that he has the final say, or that the rate-fixer is incompetent. The rate-fixer can, in my opinion, have a more difficult job than the foreman.

As regards the cost statistics, these must be put in such a form that the foreman understands them. It is essential that he should have that information to control his department; it can be put forward very briefly. The foreman should be assisted, for example, in his prime responsibility for controlling direct labour, particularly departures from piece-work prices. Including the proportion of indirect labour under his control he is responsible any way for 40 per cent. of the outgoings and ought to know something about them.

Mr. DAWE: I would like to suggest an approach to this problem. We all agree that the list of duties of a foreman is formidable and the list of qualities exceptional. I think we are asking far too much and instead of trying to find a foreman to fill the bill we should rather try to simplify his duties. If we were sufficiently fortunate to find a foreman to fill this bill, he would rapidly become the General Manager !

I suggest that what is needed is a nucleus at the top who can

deal with all these problems of controlling processes, planning, costs, initiation of improvements generally, and leave the foreman to do the job he did in days gone by. I think the old foreman was successful because he secured production and maintained quality by being a work-leader. He was not expected to be a psychologist, lawyer, etc. We are asking far too much of him. I suggest that we should have better results if his duties were considerably alleviated by giving him a straightforward job to do—leading the men in work.

Mr. MENSFORTH: I completely agree with the previous speaker. As we have seen to-night, the functional organisation does relieve the foreman of many specialised tasks; he is, however, dealing with human problems, and when those under his control do not get on with the job in a perfect fashion, difficulties will arise of which the foreman must have some reasonable understanding. As a result those who have this understanding will, I hope, become the General Managers of their concerns.

Mr. EVANS: We must look to the future. Boys come to us in most cases with a good education, and as they progress we give them administrative training and they go into the works having their feet on the bottom of the ladder.

Mr. MENSFORTH: I would like to emphasise this point because it is one which must be understood. I feel that while on the first level 990 out of 1,000 must come within my definition of "failing," nevertheless the entire 1,000 must feel that they have real opportunity for promotion; indeed, the industry which does not recognise this basis of promotion is in for trouble. This opportunity is a particular problem in the steel industry; for example, the future of the ordinary lad who goes into a forge—something which is dirty and not very nice socially. There will frequently, and of necessity, be some special training scheme, but this must provide privileged opportunity only to the degree that it is earned.

Mr. BAILEY: I presume that Mr. Mensforth is speaking of large organisations in which it is necessary for the foremen to have all these qualities, but surely the considerable duties which Mr. Mensforth has mentioned are related to the head foreman, and the costing and accounting should be left to the people who fill these positions. Surely the foremen are the people who attend to production, and that does not leave time for them to attend to other duties.

Mr. MENSFORTH: The "head foreman" is probably more a matter of terminology in this district; you do not use the word "charge-hand," for example, in some sections of engineering.

I did hope we should hear more on the question of discipline, but the fact that there is not too much apparent worry is a great credit to all concerned.

Otherwise, Mr. President, I think we have established through this discussion that the foreman's duties are such that he must be assisted by a functional organisation; the foreman must himself have a variety of accomplishments, necessarily better in some directions than in others; he must feel himself an integral part of the management and on the way to further managerial promotion.

I hope that in the future we shall not find we have failed in foremanship in the United Kingdom as a result of conditions as to holidays, rates, status, etc., as mentioned in the discussion. In my own limited experience I have seen signs in our country of definite failure to grasp opportunities, but I believe we have now passed a " flat spot " in this respect. If we cannot always find men willing to accept initial responsibility then industry will suffer, but, personally, I feel that if we are in for any trouble it will be of a type that we shall overcome.

Mr. WALKER: I should like to express thanks on behalf of all the members of this Institution, to Mr. Mensforth for a very complete and illuminating address on the important subject of " Foremen and their Duties." He has dealt with the whole range—from the human elements required in a foreman down to the " know-how " of processes.

It is with very great pleasure that I move a hearty vote of thanks as a token of appreciation of this meeting.

The PRESIDENT: We have here to-night Major Thorne, who is going to tell us what the Institution is doing, and what it hopes to do. Since he became Director and General Secretary of the Institution, we have made very great strides, and our Council and Head Office are developing great plans for the future.

Major THORNE: Before commencing to outline the progress the Institution is making, I feel I would be failing in my duty if I did not comment on the value of both the subject chosen for this evening's address and of the contributions which the audience have made to this extremely interesting debate. It is discussions such as these which not only provide food for thought for members of this Institution, but supply valuable viewpoints for all those engaged in the direction of the industrial life of this country.

This Institution, above all others, must be concerned generally with leadership, but leadership is of little avail unless it can function through a sound executive structure. In consequence, the human factor must play an important part in the problems which confront every production engineer. Machines may be efficient, but their output must always be governed by the knowledge, care and enthusiasm of the operator.

I was particularly impressed by Mr. Howes' remarks concerning power of expression, either in the written word or in speech. I know I am voicing the opinion of your Education Committee when

I say that the question of English is well to the fore in their plans for training the younger generation. It is unfortunate that the " know-hows " sometimes lack power of expression and the " know-littles " are so verbose. The " know-how " who cannot express himself is always at a great disadvantage to the latter.

This Institution is rapidly taking a prominent part in the industrial life of this country. In fact, it is becoming daily better known throughout the British Commonwealth. To date, it has 34 branches in the United Kingdom, with Sub-Councils in Australia and South Africa, a Section in Calcutta, India, and a Section likely to be formed in Auckland, New Zealand. In the United States, it has established a very close liaison with the American Society of Tool Engineers.

Likewise, the Institution has grown in numbers from approximately 5,000 at the end of the war to over 7,000 to-day, but you must appreciate that mere numbers are no yardstick. It is the status of the individual member on which the Institution must depend for its strength, and I am pleased to report that whilst it shows a numerical increase, you can be assured that the status of members joining is higher than ever before.

For this reason the Institution is gaining greater prestige and in consequence is now frequently asked to advise H.M. Government on various matters, including education, the compilation of a Survey of Scientific and Technological Manpower, and the value and use of Statistical Quality Control in industry.

In view of the present economic crisis, it is to be hoped that the Institution will take a very full share in trying to improve our economic situation. It should be very much concerned with the quality of engineering products, the cost of production, and the speed with which they can be made available for export.

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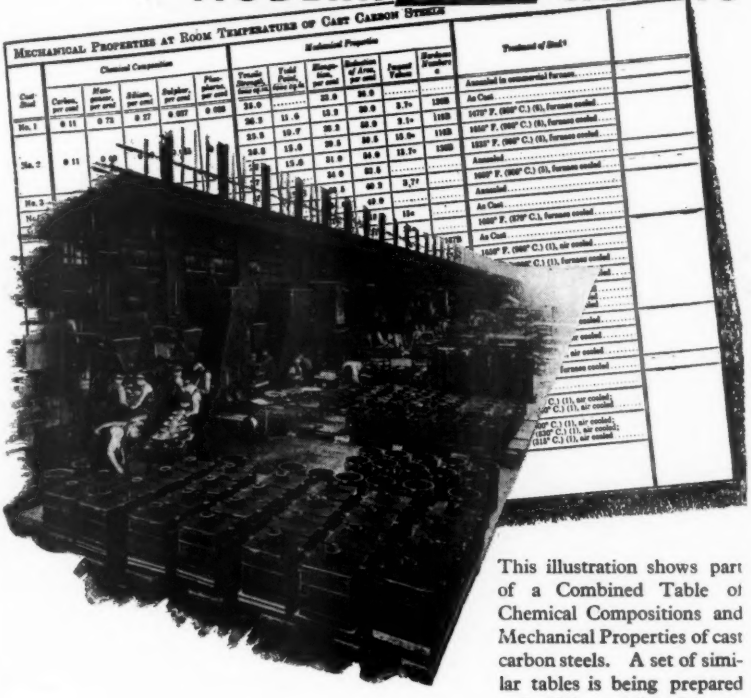

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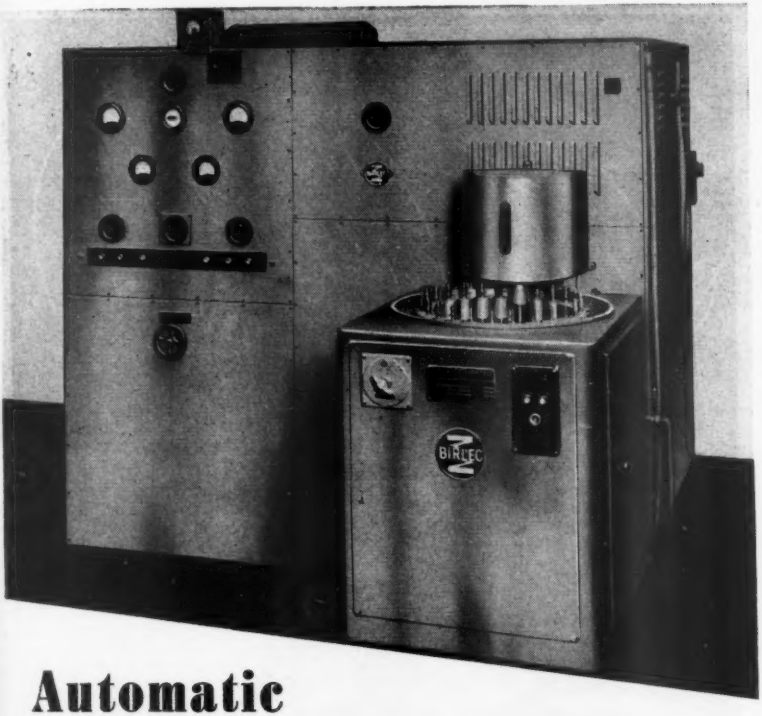

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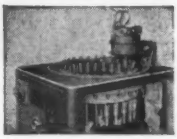

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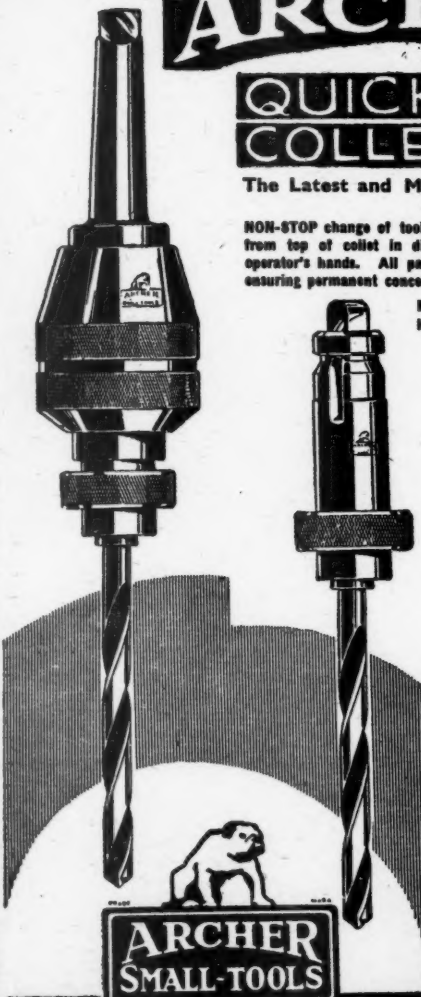

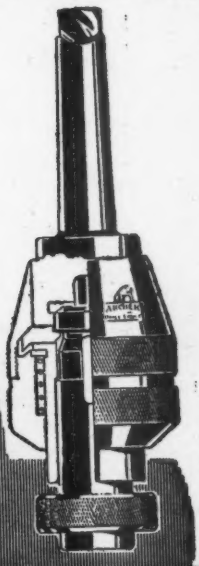

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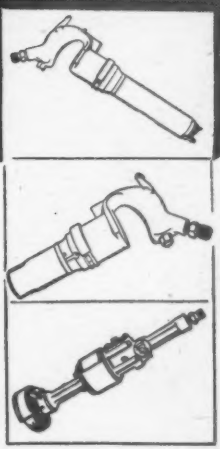

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